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Publication number: **0 607 525 A1**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 93118680.3

(51) Int. Cl.⁵: B65H 19/26, B26D 7/20

(22) Date of filing: 19.11.93

(30) Priority: 07.01.93 US 1734

(43) Date of publication of application:
27.07.94 Bulletin 94/30

(84) Designated Contracting States:
AT BE CH DE FR GB GR IT LI SE

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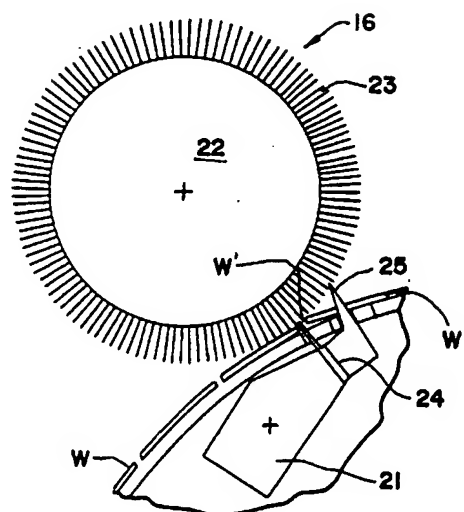
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(54) Cut-off and transference mechanism for rewinder.

(57) A method of rewinding a web (W) on cores to provide retail-sized rolls wherein the web (W) is carried by a bedroll (14,114) equipped with an emergent knife means (21,24,124) for cutoff and control means (25,125) for transfer of the web (W), the knife (24,124) and control means (25,125) operating on the web (W) in conjunction with a brush roll (16).

Fig. 3



EP 0 607 525 A1

BACKGROUND AND SUMMARY OF INVENTION:

This invention relates to a cutoff and transference mechanism for a rewinder and, more particularly, to a mechanism utilizing a brush roll as an anvil roll.

In the rewinding of cross perforated webs such as toilet tissue and kitchen toweling, a jumbo parent roll of five feet or so in diameter is unwound and rewound on cores to form the well-known retail sized rolls. To perform this efficiently, the web must be severed, carried to the rewinding station and adhered to the core -- all at line speed. Exemplary of a widely-employed cutoff and transfer mechanism is that of co-owned, expired Patent No. RE. 28,353.

Prior to the '353 patent, there was a rewinder speed limitation of 1500 feet per minute because above that the cutoff and transference mechanism would literally hammer itself to pieces. The '353 patent overcame this limitation by providing a cutoff at one location and transfer at another location.

In the '353 patent, a bedroll containing an emergent knife/impaling means operated to simultaneously sever the web along a line of transverse perforation and impale the leading edge of the severed web for controlled movement through an arc to the rewinding station. For this cutoff and impaling an anvil roll containing resilient pads was employed and the emergent knife/impaling means pressed the web against the anvil roll.

The invention utilizes a brush backup roll in place of the conventional anvil roll. Such backup rolls have been used in perforation, scoring and slitting, being available from The Industrial Brush Co. of Fairfield, New Jersey. However, they have not been used in an environment where the web had a free leading edge. With rewinding speeds of the order of 2,000-3,000 feet per minute, any failure to control the free leading edge of the web could result in a large quantity of paper being ruined as well as costly clean-up.

In particular, it is critical to properly control the free leading edge of the web on the pointed transfer fingers or by vacuum. This was insured by the combination of pointed fingers and the resilient pads of the prior art. There was no obvious assurance that these fingers operating against bristles would achieve the necessary capturing of the edge portion of the web. Also, there was no assurance that the vacuum pickup would work on a free leading edge portion when in contact with brush bristles. In particular, it was felt that a free web might be caught on the bristles of the backup roll and thus frustrate the object of the whole rewinding operation.

This unacceptable action does not occur when a brush utilizing a substantially dense arrangement of bristles is employed. Additionally, the use of a brush back-up roll results in the significant advantage of not having to carefully time the back-up or anvil roll. This was necessary with the pad-equipped anvil rolls of the past to make sure that the emergent means (particularly the knife blades) were circumferentially aligned with the anvil roll pads. This advantage is on-going because replacement is so much simpler in the inventive arrangement.

In general, the invention contemplates the steps of continuously advancing a web along a longitudinal path, advancing the web through a perforator in the path to develop equally longitudinally spaced transverse lines of perforation, thereafter advancing the web through a nip defined by a cutoff bedroll and a brush equipped anvil roll, the bedroll being equipped with emergent means for simultaneously completely transversely severing the web to provide a leading edge portion and for controlling the leading edge portion on either pointed finger means or by vacuum, substantially completely severing the web and controlling the leading edge portion, and advancing the leading edge portion into contact with an adhesive equipped core for transfer thereto.

An object of the invention is to provide a novel backup roll in combination with emergent means including both knife means and means for controlling the free leading edge of a severed web for arcuate travel to a web rewinding station. Another object is to provide a backup roll which is not subject to the need for extensive assembly or setup -- especially the need for timing the cutoff and transfer of the web. Other objects and advantages of the invention may be seen in the details of the ensuing specification.

BRIEF DESCRIPTION OF DRAWING:

The invention is described in conjunction with the accompanying drawing in which --

FIG. 1 is a side elevational view, essentially schematic, of a rewinder incorporating the invention;

FIG. 2 is a developed fragmentary end elevational view, essentially schematic of a rewinder construction of the winder seen in FIG. 1; FIG. 3 is an enlarged fragmentary side elevational view of a portion of a bedroll carrying knife and pointed finger emergent means for cutoff and transfer along with a backup brush roll;

FIG. 4 is a view similar to FIG. 3 but features a subsequent step in the bedroll and backup roll operation; and

FIG. 5 is a fragmentary side elevational view similar to FIGS. 3 and 4 but showing vacuum as the control means.

DETAILED DESCRIPTION

In the illustration given in FIG. 1, the numeral 10 designates generally a frame which is conventional in rewinders. More particularly, the frame 10 includes a pair of longitudinally extending side frames 10a and 10b (see FIG. 2) which provide an elongated path and support a number of rotatable rolls therebetween.

Returning to FIG. 1, the numerals 11 and 12 at the upper left hand portion of the view designate pull rolls or draw rolls which operate to advance a web W from a parent roll (not shown). The web is further advanced by a perforator bedroll 13 and a transfer bedroll 14. Cross perforations as at W' are provided in the web -- see also FIGS. 3 and 4 -- by a knife-equipped perforator bedroll 13 operating against a stationary anvil 15. The widely used perforator is seen in co-owned, expired Patent No. 2,870,840.

The web in proceeding along the path P defined by the frame 10 is in partial wrapping relation to a bedroll 14. The numeral 16 designates the brush roll which operates as a backup roll in combination with the bedroll 14 for the cutoff and impalement of the free leading edge of the web W.

The invention is described in conjunction with a "center-wound" type of rewinder, particularly of the type of Patent RE. 28,353. However, the invention can be used equally advantageously with surface wound types such as those seen in co-owned Patents No. 4,828,195 and 4,962,897, and earlier Patent No. 4,487,377.

Referring specifically to FIG. 1, the numeral 17 designates generally a mandrel-equipped turret which is mounted for rotation in rewiner frame 10 and which is disposed in parallel, side-by-side relation with the bedroll 14. In the illustration given, the turret 17 is equipped with six mandrels as at 18, the mandrels being arranged for sequential movement into web-contacting relation.

In the operation of the turret 17, a core on which the web W is to be wound is inserted on the mandrel 18 in the station designated by the letter A. In the operational sequence, a mandrel 18 is rotated from the core-receiving station A into the station B, where previously the core was slit to correspond to the axial length of toilet tissue or towel rolls. Now the cutting is performed on the completely rewound roll-termed a log.

Thus the station B is unused in current rewinders. Further rotation of the turret 17 brings a mandrel 18 to the station designated C where glue-applying mechanism operates to provide each core

segment with glue between the stations C and D. Still further rotation of the turret moves the mandrel into the station D, where the new mandrel is accelerated to transfer speed preparatory to transfer. In the station D, the mandrel 18 is engaged with the driving belt 19 and is accelerated to web speed. As the mandrel moves toward station E transfer occurs.

During movement from station E to station F, the mandrel 18 continues moving down and increasingly away from the bedroll 14. Prior to reaching station F, a discrete, predetermined length of the web has been wound and cut off, after which the mandrel arrives in position F, which is the finished roll-removing station.

Finished roll removal is achieved through the mechanism seen in co-owned Patent 2,769,600. The intermittent operation of the turret 17 is achieved through a Geneva gear and other suitable mechanism (not shown), which indexes shaft 20. The mandrels 18 may be driven by a motor through the belt 19 previously described. Details of the belt drive can be seen in co-owned, expired Patent No. 3,116,890.

CUTOFF AND TRANSFERENCE

Turning now to FIG. 3, the symbol W again designates the web but here in the process of being in contacted by the emergent means 21. These operate in conjunction with the brush roll 16 which is equipped with bristles protruding from a central core 22 as at 23.

The emergent means includes a blade 24 which engages the web W at a line of cross perforations W' and results in a free leading edge W'' which is impaled on a pointed finger means 25. More particularly, a plurality of such fingers are employed aligned transversely of the rewinder so as to insure secure capture of the free leading edge W''. More particularly, in FIG. 3, the knife blade 24 is seen partially inserted into the bristles 23 to insure proper cutoff.

In FIG. 4, the pointed finger means 25 are seen entering into the protruding bristles 23 of the brush roll 16' to make sure that this capture is achieved. After leaving the bristles 23 of the roll 16' the finger means 25 convey the leading edge W'' of the web W into contact with a core for the development of a new retail sized roll.

In FIG. 5, an alternative embodiment is illustrated where the pointed finger means are replaced by vacuum ports 125 in bedroll 114. There is however, the same emergent knife 124. Also, the details of the bristle-equipped anvil roll 116 is substantially the same as that of the embodiment illustrated in FIGS. 3 and 4.

The bristle density is of the order of about 500-3000 per square inch with 1600 being optimum. The bristle diameter is of the order of about .005-.050 inch with .016 inch being optimum. The bristle length is of the order of about 0.25-1.25 inch with 0.5 inch being optimum. The roll diameter (including protruberant bristles is of the order of about 5-20 inch with 7.5 inch being optimum.

It has been found advantageous to operate the bristle-type anvil or backup roll at a speed different from the speed of the web. More particularly, the surface speed of the brush roll can range from 15% to 20% below web speed to 15% to 20% above web speed. This avoids catching the web on the brush roll.

The speed of the various rolls is advantageously achieved through drive means such as that depicted schematically in FIG. 2 where the numeral 26 designates generally a timing belt connecting a pulley on the shaft 27 of the bedroll 14 and a pulley on shaft 28 of the backup roll 16. These are conventionally driven by motor means (not shown). An advantage of the brush roll is that accuracy of gears is not needed.

While in the foregoing specification, a detailed description of the invention has been set down for the purpose of illustration, many variations in the details hereingiven may be made by those skilled in the art without departing from the spirit and scope of the invention.

Claims

1. A method of web winding comprising the steps of continuously advancing a web along a longitudinal path, advancing said web through a perforator in said path to develop equally longitudinally spaced, transverse lines of perforation, thereafter advancing said web through a nip defined by a cutoff bedroll and a brush equipped anvil roll, said bedroll being equipped with emergent means for simultaneously completing transversely severing said web to provide a leading edge portion and for controlling said leading edge portion on said bedroll, advancing said leading edge portion into contact with an adhesive-equipped core, and simultaneously with said contact removing said leading edge portion from said bedroll.
2. The method of claim 1 in which the surface speed of said anvil roll is different than the speed of advance of said web.
3. The method of claim 1 in which said controlling means include pointed finger means and said steps include impaling said leading edge portion on said pointed finger means.

4. The method of claim 1 in which said controlling means include vacuum port means in said bedroll and said steps include atmospheric pressure adherence of said leading edge portion on said vacuum port means.

Fig. 1

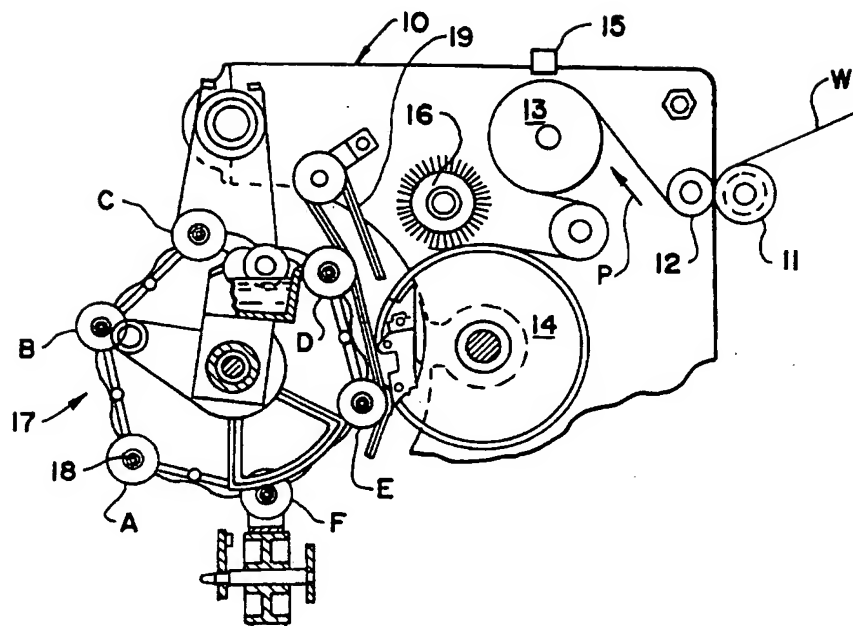


Fig. 2

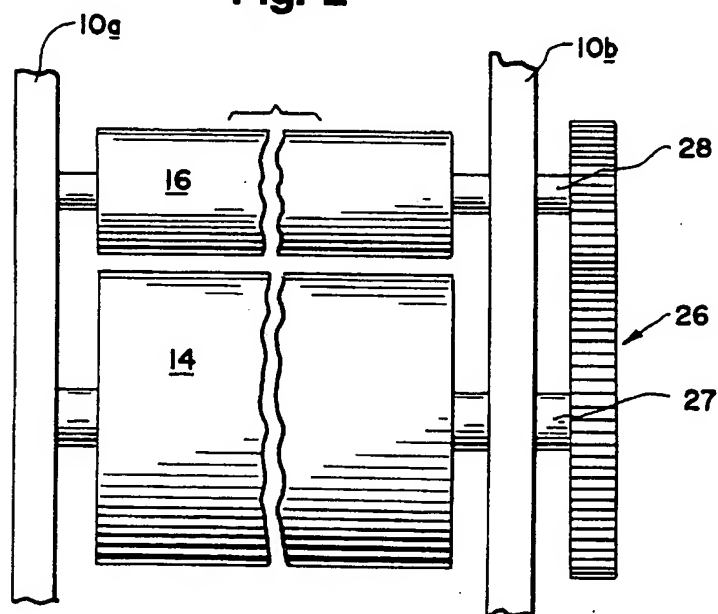


Fig. 3

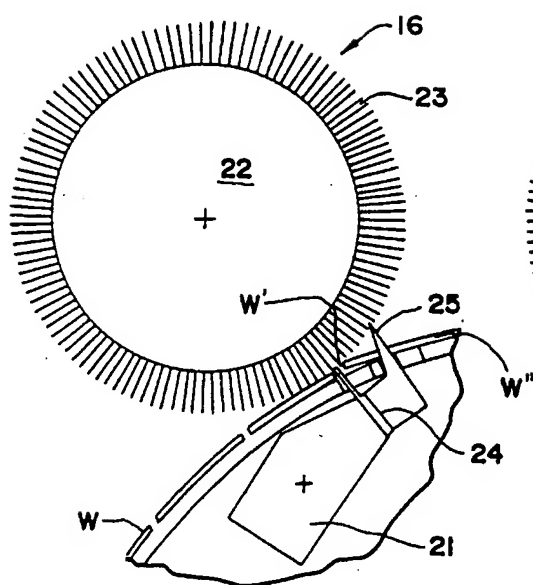


Fig. 4

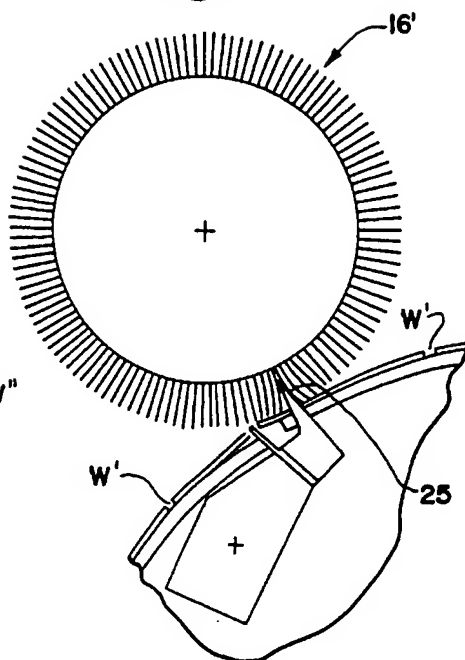
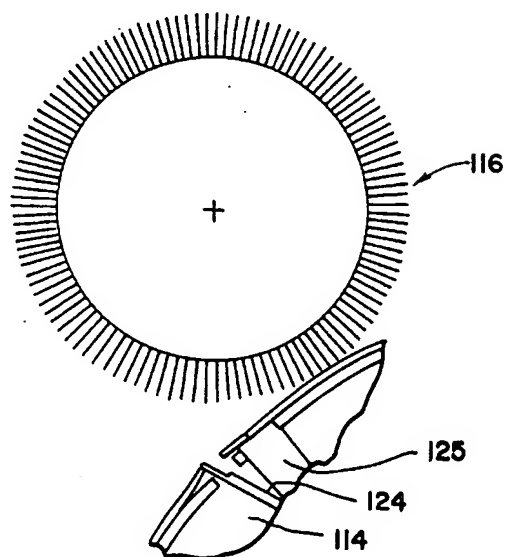


Fig. 5





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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 8680

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
Y,D	US-E-28 353 (E.D. NYSTRAND ET AL) * the whole document * ---	1,3	B65H19/26 B26D7/20
Y	GB-A-599 170 (F.J. CONNOLLY) * claim 1; figure 3 * * page 3, line 17 - line 27 * ---	1,3,4	
Y,D	US-A-4 487 377 (F. PERIAI) * figures 1-6,12 * * column 4, line 22 - column 5, line 37 * ---	1,4	
A	US-A-3 128 057 (R.E. BARNHART ET AL.) * figures 1,3 * * column 3, line 10 - line 70 * * column 6, line 48 - column 7, line 3 * * column 7, line 30 - line 66 * ---	1,3	
A	US-A-3 618 436 (D.A. BROWN) * claim 1; figure 4 * * column 3, line 16 - line 44 * ---	1	
A	US-A-3 604 302 (C.W. SMYTHE) -----		TECHNICAL FIELDS SEARCHED (Int.Cl.5) B65H B26D
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	25 April 1994	Häusler, F.U.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- A : member of the same patent family, corresponding document	